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TORREY BOTANICAL CLUB

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New Species of Fungi from various Localities

BY J. B. ELLIS & B. M. EVERHART

Asterina agaves E. & E.

On *Agave atrovirens*, Apam, Mexico, April, 1900 (Professor Wm. Trelease, no. 194).

Perithecia in suborbicular groups .5–1 cm. across, superficial, subglobose, 80–100 μ in diameter, astomous: asci obovate, 50–60 × 20 μ: sporidia crowded-biseriate, clavate oblong, uniseptate near the broader end, constricted at the septum, ends obtuse, 15–27 × 6–8 μ.

Between and around the perithecia the leaf is thinly clothed with short, brown, subfasciculate hairs.

Dothidella heucherae E. & E.

On living leaves of *Heuchera cylindrica*, Waitesburg, Wash., Mar. 11, 1900 (R. M. Horner, no. 1418).

Forming a thin, suborbicular, black crust on the upper surface of the leaf, .5–1 cm. diameter and becoming more or less distinctly bullate and surrounded by a narrow, reddish-purple zone: ascigerous cells (perithecia) globose, small, 80–100 μ, numerous, monostichous, buried in the stroma the surface of which is roughened by the erumpent ostiola: asci sessile, oblong-cylindrical, 22–35 × 8–10 μ: sporidia biseriate, oblong, hyaline, 3–4-nucleate, then uniseptate in the middle but scarcely constricted, 15–20 × 3–3.5 μ.

Phyllosticta heucherae E. & E., Am. Nat. **31**: 428. 1897, is the spermogonial stage of this.

Urocystis gei E. & E.

On leaves of *Geum ciliatum* Pursh, Waitesburg, Wash., May 7, 1900 (Robert M. Horner, no. 1430).

Sori epiphyllous, bullate, elongated, .5–1 cm. long, opening along the middle as in *U. anemones*, formed by the inflated epidermis; central spores paler, subglobose, 12–16 μ diam.; peripherical spores darker, slightly granular-roughened, globose, 10 μ diam., or ovate, 10 × 6–7 μ.

Puccinia bicolor E. & E.

On leaves of *Hieracium Scouleri* Hook., Waitesburg, Wash., May 7, 1900 (Robert M. Horner, no. 1433).

Mostly hypophyllous but also amphigenous. Teleutospore sori small (.25–.5 mm.), subcuticular straw-yellow, flat and scale-like at first, gregarious and subconfluent on pallid, subindefinite, orbicular, subconfluent spots 3–5 mm. diam. The central sori soon become black and thickened and burst the cuticle which, however, still partly envelops them. Teleutospores clavate- or obovate-oblong, smooth, upper cell subglobose, the epispore strongly thickened above, often subtruncate and almost opake, lower cell mostly narrowed to the stout pedicel which is of about the same length as the spore, which is distinctly constricted.

Very different from *P. hieracii*.

Phyllosticta similispora Ell. & Davis.

On *Solidago rigida*, Racine, Wis., Sept., 1898 (Davis, no. 984).

Epiphyllous, spots small, scattered, black, convex, 1–2 mm. diam., sometimes confluent, without any definite border resembling small black swellings on the leaf; perithecia prominent, black, 100–150 μ diam., 1–6 on a spot; sporules almost exactly like those of *P. sphaeropsispora* E. & E. on *Solidago confinis* from California, obovate-elliptical, shaped much like apple seeds, some of them globose (perhaps because seen endwise).

The California species is on large, 1 cm., thin, white spots with a narrow but distinct margin.

Phyllosticta smilacis E. &. E.

On leaves of *Smilax*, Oldtown, Me. (Prof. F. L. Harvey). Common also around Newfield, N. J., and sent from various other sections.

Spots brick-color, round, .5–1 cm. diam. with a sharply defined border, often paler in the center; sporules oblong-elliptical or broad-fusoid, 15–20 × 7–9 μ.

This has been observed on various smooth-leaved species of *Smilax*, for twenty years or more, but it does not appear to have been described. Specimens occur with uniseptate spores (*Ascochyta*) but usually there is no septum.

Phoma zeicola E. & E.

On dead leaves of *Zea Mays*, Tuskegee, Ala., July, 1897 (Geo. W. Carver, no. 259).

Perithecia innate, thickly but evenly scattered, visible on both sides of the leaf, 80–100 μ diam.; sporules fusoid-oblong or oblong-elliptical, 4.5–5.5 × 1.5 μ.

Phoma orthosticha E. & E.

On leaves of *Typha latifolia*, Orono, Maine, October, 1899 (P. L. Ricker).

Perithecia subcuticular, minute (40–50 μ), arranged in narrow strips 3–6 mm. long between the nerves of the leaf; sporules oblong-elliptical, minute, 2.5–3 × .75–1 μ.

Comes near *P. gyneriicola* Cke., but that has the perithecia scattered or gregarious. Differs from *P. typharum* Sacc. and *P. serialis* Pat. in the size and shape of the sporules.

Sphaeropsis nubilosa E. & B.

On bark of exposed root of *Fraxinus viridis*, Rooks Co., Kansas, (Bartholomew, no. 2772).

Gregarious, superficial, forming a round, black patch 1 cm. or more across. Perithecia globose or slightly depressed-globose, with the base only slightly sunk in the bark, 300–400 μ diam. with a papilliform ostiolum; sporules oblong-elliptical 15–20 × 7–8 μ.

Differs from *S. biformis* Pk. and *S. Pennsylvanica* B. & C. in its superficial growth. This can not be confounded with *Diplodia rhizogena* E. & B. which has the same habitat.

Hendersonia kalmicola E. & B.

On dead twigs of *Kalmia latifolia* killed by fire a year ago. Newfield, N. J., May 20, 1900.

Perithecia 2–3 lying side by side in the blackened substance of the bark which is split longitudinally and slightly raised, the papilliform ostiola being visible in the narrow chinks; sporules elliptical or slightly obovate, 3-septate, pale brown, 12–15 × 6–8 μ, on slender pedicels about 15 μ long.

SEPTORIA MEGASPORA Speg.? Fung. Arg. Pug. 1, 188

Kellermannia mutica E. & E. in herb.

On leaves of *Yucca filifera*, Monterey, Mexico, March, 1900, and on leaves of *Agave Lechngrulle*, Peyotes, Mexico, April, 1900 (Dr. Wm. Trelease).

Perithecia scattered, sunk in the substance of the leaf, .5–1 mm. diam., raising and throwing off a circular piece off the cuticle directly over them: sporules clavate-cylindrical, hyaline, multiseptate, scarcely constricted, 70–100 × 8–10 μ, attenuated above to an obtuse point, sessile, fasciculate.

Differs from Spegazini's description in the multiseptate spores and might properly be placed in the genus *Phleospora*.

Septoria annua E. & E.

On partly dead leaves and culms of *Poa annua*, London, Canada, May, 1900 (J. Dearness).

Perithccia scattered, black, depressed-globose, pierced above, 75–110 μ diam.; sporules abundant, filiform, mostly attenuated below, nucleolate, hyaline, 30–40 × 1.5 μ, slightly curved. Comes very near *S. tenella* C. & E.

Septoria cylindrica E. & E.

On *Anemone cylindrica*, Bozeman, Montana, July, 1878 (J. W. Blankenship, no. 78).

Perithecia hypophyllous, globose, 100–110 μ diam., black, erumpent, scattered on pallid, indefinite spots; sporules fusoid-cylindrical, moderately curved, 25–35 × 2.5–3 μ, 3-(pseudo-)septate, nucleate at first.

Melanconium angustum E. & E.

On dead hickory limb, Newfield, N. J., Feb., 1900.

Acervuli minute, raising the epidermis into small pustules, then erumpent, often compressed; conidia oblong, olive-brown, 2–3-nucleate, straight or nearly so, 12–16 × 4–5.5 μ, narrower and darker than in *M. pallidum* Pk., and acervuli smaller.

Melanconiopsis E. & E., gen. nov.

This is *Melanconium* with the cellular stroma of *Cytispora*, and with the spores of *Melanconium*. Doubtless the stylosporous stage of *Melanconis* or *Massariovalsa*.

Melanconiopsis inquinans E. & E.

On dead limbs of *Acer dasycarpum*, Louisville, Kansas, May, 1900 (Bartholomew, no. 2519).

Stroma sunken in the bark, which is raised into pustules and blackened by the ejected spores; cells 6–10, globose, circinate, about .5 mm. diam., finally confluent, their slender necks convergent and united above in a single papilliform or short-cylindrical, erumpent ostiolum; sporules oblong-elliptical, brown, 20–30 × 12–15 μ on short basidia.

Cylindrosporium ariaefolium E. & E.

On leaves of *Spiraea ariaefolia* Wats., Latah Co., Idaho, July, 1899 (R. M. Horner, no. 1216).

Spots small, 1–2 mm., deep-brown, purplish-brown at first with the margin lighter, numerous, of irregular shape; acervuli epiphyllous, rather large and flat, brown; conidia lunate, nucleate becoming 3-septate above, 30–45 × 3.5–4 μ.

Differs from *C. spiraeicolum* E. & E. in the different color of the spots, curved and rather broader spores attenuated towards each end.

In the description of *C. spiraeicolum* the conidia are erroneously stated as 3.5–5 μ thick, whereas they are mostly only 3–3.5 μ.

Cylindrosporium smilacis E. & E.

On *Smilax* sp., Tuskegee, Ala., July, 1897 (Geo. W. Carver).

Spots ferruginous-brown, 4–5 mm. diam., orbicular or partly limited by the veinlets of the leaf, sometimes with a narrow, darker colored border; acervuli epiphyllous, covered by the cuticle, 80–110 μ diam., conidia discharged in little white heaps, curved, 3-septate, hyaline, 20–30 × 2.5 μ.

Pestalozzia bicolor E. & E.

On dead leaves of *Salix* sp., Tuskegee, Ala., Dec., 1897 (G. W. Carver, no. 387).

Acervuli amphigenous, subcuticular, scattered and here and there subcespitose, small, raising the cuticle into little yellowish-

white pustules which become darker. Conidia fusoid-oblong, 4-septate, three inner cells brown, terminal cells conical and hyaline, the colored part 13–15 × 5–7 μ, or including the terminal cells 20–22 μ long; crest of 3–5 spreading, hyaline bristles 13–15 μ long.

The light colored acervuli are all that distinguish this from *P. guepini* Desm.

PESTALOZZIA COCOLOBAE E. & E. Botan. Series Field Columbian Museum, **1**:

Specimens of this species sent from southern Florida by H. H. Hume on the same host as the Yucatan specimen (*Cocoloba uvifera*) have spores only 3.5–4 μ wide or exceptionally 5 μ, making it altogether probable that *P. cocolobae* is only a form of *P. guepini* Desm.

SEPTORIA FULVESCENS Ell. & Halst. Bull. Torr. Club, **27**: 57. 1900

This name should be **S. flavescens.** There is already a *Septoria fulvescens* Sacc. on *Lathyrus.* See Sacc. Syll. Fung. **3**: 110.

Ramularia brevipes E. & E.

On leaves of *Monarda Clinopodia?* Tuskegee, Ala., May, 1897 (Geo. W. Carver, no. 224).

Hypophyllous. Appearing at first as pale indefinite spots which soon become confluent over the greater part of the leaf and gray from the abundant conidia, and the leaf finally becomes brown and dead: conidia filiform, nucleolate, hyaline, mostly curved, 30–60 × 2–2.5, arising from short, fasciculate, elliptical or short cylindrical, 8–12 × 3–4 μ, basidia being hardly more than elongated cells of the proligerous layer.

No indications of any *Entyloma* were observed in connection with this.

RAMULARIA AGOSERIDIS E. & E., in Ell. & Evrht. N. A. F. 3079

On *Agoseris pulchella,* Berkeley, Calif. (Blasdale) and on *Troximon grandiflorum,* Waitesburg, Wash., May, 1900 (Robert M. Horner, no. 1437.

Spots definite, often terminal or marginal, dirty brown, .5–1 cm. diameter, hyphae amphigenous, in compact, punctiform tufts, simple,

mostly straight, continuous, often attenuated above and subdentate, 20–25 × 4 μ, hyaline, conidia oblong or cylindrical, hyaline, nucleate, obtuse, 12–22 × 5–6 μ.

This was issued in N. A. F. but as far as we can find has not heretofore been described.

Ramularia sphaerioides E. & E.

On living leaves of *Thermopsis montana* Gray, Waitesburg, Wash., May, 1900 (Robert M. Horner, no. 1458).

Hypophyllous, on small (1–2 mm.) irregular pallid spots which finally become more definite and rusty-brown above; hyphae densely fasciculate in small sphaeroid tufts 75–80 μ diameter of a slaty-gray color, the single hyphae 20–30 × 2–2.5 μ, septulate and smoky hyaline, subdentate above, conidia ovate-elliptical, uniseptate, slightly roughened, filled with small nuclei, 12–22 × 7–10 μ.

Differs from typical *Ramularia*.

Cercospora phyllitidis Hume

On *Polypodium Phyllitidis* L., Hobe Sound, east coast of Florida, March 14, 1900 (H. H. Hume).

Spots brown, of irregular outline, 1–2 cm. diameter: fertile hyphae, brown, sparingly septate, undulate, 60–80 × 3.5–4 μ, in dense, spreading tufts thickly scattered over the spots on both sides of the leaf but more abundant below, conidia lanceolate, 3–5-septate, hyaline, 40–80 × 3–3.5 μ.

Cercospora smilacinae E. & E.

On leaves of *Smilacina sessilifolia* Nutt., Latah Co., Idaho, July, 1899 (Robert M. Horner, no. 1293).

Spots amphigenous, oblong-elliptical, 2–4 × 1–2 mm., grayish-white, bounded by a red line; fertile hyphae mostly epiphyllous, very short, 10–12 × 3 μ, crowded in dense tufts 35–50 μ diameter which are soon obscured by a subcrustaceous, black mycelium occupying the center of the spots. The tufts of hyphae also appear on dead areas of the leaf outside the spots, arranged in a seriate manner between the nerves of the leaf: conidia filiform, subundulate or slightly curved, 40–60 × 2.5 μ, greenish or yellowish-hyaline, with a single pseudoseptum near the middle, exceptionally 2–3 pseudoseptate. The fertile hyphae are hyaline with a brownish tint below.

Cercosporella colubrina E. & E.

On leaves of *Solidago salsuginosus*, Columbia Co., Washington, July, 1897 (R. M. Horner, no. 1354).

Amphigenous, on round or subelongated, definite white spots 1–2 mm. diameter thickly scattered over the leaves, reminding one of the skin of a spotted snake or lizard: hyphae in minute closely crowded tufts in the center of the spots, cespitose, hyaline, delicate, 22–25 × 1.5 μ, entire or slightly toothed above, continuous: conidia filiform, straight or slightly curved, 30–40 × 1–1.25 μ, hyaline, straight or slightly curved, faintly nucleolate.

Distinct from *C. nivea* E. & B., or *C. nivosa* E. & E. in its distinct white spots and less robust habit. *C. cana* Sacc. is also different.

The local Distribution and Occurrence of the Fungi of Austin, Texas, and Vicinity

By W. H. Long, Jr.

To understand properly the peculiar fungal distribution and occurrence of this vicinity it is necessary to state briefly the geological conditions and environment.

Austin is located on the Cretaceous, mainly on the Upper Cretaceous, and more specifically on the Austin-Dallas Chalk and Shoal Creek limestone. As the name indicates, this formation is marine and most of it deep-sea deposit.

Our soil is therefore chiefly made from the detritus of these old marine limestone strata. The surface here is very broken, composed of rough, rocky hills with limestone exposed over the greater part of them, with narrow, shallow valleys and arroyos, whose soil has little depth, with here and there an occasional bed of sand and gravel, the remnants of the Tertiary and Quaternary river drift deposits. Austin is situated on the margin of the Edwards Plateau, whose coastward border is the Balcones Escarpment that extends from the northern line of Travis County to the Rio Grande.

The city proper being on the downthrow side of a series of faults that determine this escarpment, is about five hundred feet below the summit of the Edwards Plateau proper, and just east of it and the Colorado River. Practically the same conditions prevail here as on the plateau, viz.: rocky limestone hills, studded with clumps of mountain cedar, barberry, mountain oak, and live oak, none of which make a compact shady forest growth.

While the valleys are sprinkled with a scattering growth of mesquite, and near the edges of the creeks are found elm, hackberry and an occasional cottonwood, near the Colorado River, on the Tertiary and Quaternary gravels, are found clumps of post oaks and black jacks.

Austin is also on the eastern margin of the Lower Sonoran life zone, a zone characterized by a semi-arid xerophytic vegetation, which corresponds well with the geological conditions.

Most fungi, owing to their ephemeral nature, need an abundance of water to make their food supply quickly and sufficiently available; therefore in localities visited by long-continued rains or having an atmosphere laden with moisture, as well as in marshy districts and dark damp forests where evaporation is retarded, fungi are found in great quantities and of many species. On the contrary, when an abundance of water is wanting we may expect to find only a limited number of species.

From the geological and climatic environments that exist, the distribution and occurrence of fungi in this vicinity is found to be limited by three very important factors: (1) The nature of the soil, (2) The paucity of densely wooded areas, especially of large damp forests, and (3) The climatic conditions.

Discussing each of these factors more specifically, we find that the soils in the vicinity of Austin, are formed mainly from limestone detritus and with little vegetable débris in them. The innumerable hillsides and slopes cause much of the surface soil, which contains the vegetable matter, to be washed away, leaving a soil deficient in humus and incapable of nourishing fungi.

The habitat of the majority of our saprophytic fungi is in the valleys and under the trees, especially under the cedars where the débris of leaves, etc., cannot easily be washed away. In some localities clay, gravel or sandy soils are found but these are likewise deficient in organic matter to such an extent that unless sheltered by trees, very few species of fungi are found growing in them. As a rule, then, the soil conditions of this vicinity are unfavorable to fungal growths, except in old pastures where the soil is rich from the droppings of stock. Here we often find fungi in great quantities as regards individuals but usually limited to a few species.

The second condition, lack of deep, dense forests with their ever-present humus in the débris at their roots, excludes a large number of shade-loving species. Our trees, mainly oaks and cedars, are not tall and compact, nor are they sufficiently massed to form dark, damp places, consequently the quantity of humus formed and retained in the soil beneath them is small and not sufficient to encourage or promote the growth of fungi to any great extent.

The third condition, that of climate, is the most potent factor

of the three; it includes the effects of light, heat and moisture, water especially being needed to properly develop the fructification organs of fungi.

Austin is subjected as a rule to sudden and violent variations in temperature, to long periods of exceedingly hot dry weather accompanied by intense sunlight, all of which tax the vitality of the higher green plants much more than that of the fungi. If the quantity of moisture in the air were great it would permit some species to exist here that are otherwise excluded, but the vapor density in this locality is at a minimum.* These climatic forces all operate to deter and limit, or even exclude many species from thriving here that otherwise might be expected. These forces also play an important part in the distribution and number of the parasitic species. The xerophytic character of this region causes a large percentage of the native plants to protect themselves from too much sunlight, heat and evaporation, by clothing their leaves and other green parts with a thick, tough epidermis, with a dense coating of hairs, with stomata so arranged as to remain closed, much of the time, or so sunken beneath the surface as to become inaccessible. The entire plant thus becomes hard, woody and impervious. The spores, therefore, have great difficulty in ever reaching the epidermis as the clothing of long, dense hairs tends to catch and hold them away from the surface. The few that chance to reach the epidermis and germinate are often unable to pierce it with their delicate hyphae and the stomata being closed or inaccessible the germ tubes cannot enter by that route.

The spores, after finding lodgment on the epidermis, often fail to even germinate from lack of sufficient moisture or the intense heat and sunlight may even destroy their vitality. These facts account for the comparative freedom from fungal attacks of most of our oaks, barberry, mesquite, cedar, etc. In the spring when the leaves are young and tender and when moisture is abundant, the fungi may obtain a foothold and often do, or in the summer during protracted rainy periods,† the spores may germinate and often do so,

* The months of July, August, and September during the past season have been a remarkable exception in possessing a high degree of humidity, which has been most evident in foliage and in the development of parasitic fungi.

† As during the past summer.

spreading the fungi rapidly over wide areas. In this manner wheat rust becomes very virulent and destructive.

The majority of the introduced species of the cereals and of other plants are often attacked by the ephemeral fungi, to which they are subjected in their older habitat. Such are the various rusts and smuts infesting wheat, oats, corn, clover. As a rule, the parasitic fungi of this vicinity are very limited in number of species. In this group come two species of *Gymnosporangium* *G. macropus* on *Juniperus Virginiana*, the other a new form found on mountain cedar, *Sabina sabinoides*, which does not form galls or "apples," but the teleutospore masses break out directly from the stem or leaf in rows, like the teeth of a comb, common during March on the mountain cedar, but never found on *J. Virginiana*. Several species of *Puccinia*, one on *Berberis trifoliata* (barberry), aecidium stage, very rare, stages I, II, III, and spermagonia present, only one infected bush found. A species of *Uromyces* on the mesquite (*Prosopis juliflora*), forms large oblong-cylindric galls or "apples" on the petioles and petiolules, about 2 cm. long by 5 cm. thick, covered with oblong brown sori, which are filled with uredospores; not common, only infesting an occasional tree; II and III stages found on leaves in July, after "apples" have fallen. Another fungus attacks the under side of the mesquite leaves, especially those of the small bushes.

Of the saprophytic fungi we find several well-marked types. Group I, includes those inhabiting various kinds of dung. These are few in number, but have a wide range as to time and place of occurrence, their peculiar habitat producing the environments necessary to a quick growth, therefore on the slightest rain or even dew they send up their organs of reproduction and disseminate their spores. Species of *Ascobolus*, *Lasiobolus*, *Coprinus*, *Psilocybe* and *Stropharia* form some of this group.

In Group II are those growing in the cedar brakes beneath the trees; the cedars especially form at their bases a mass of decaying débris, which persists year after year, and thus attains a thickness of several inches. This being shaded by the overhanging boughs, produces and retains a humus, thereby securing more favorable conditions for fungal growths than in the open, unshaded places. We therefore find quite a diversity of species in such localities.

They form a distinct group, having few or no species in common with the other geographical groups. Several of the Lycoperdales are found here, also a large *Sarcosphaera* with an oil drop in the center of its hyaline spore. In this group comes a *Helvella* with spores like those of *Sarcosphaera;* a large *Morchella* nearly one foot tall, with pileus the color and texture of beeswax; and two species of *Lepiota* with perfectly smooth pilei.

In Group III are those found under the post oaks (*Quercus minor*) and black jacks (*Q. Marilandica*), generally in sandy, gravelly soil, or in the débris of leaves that the winds have collected into heaps, often one foot deep and several yards wide. Here is a totally different fungal vegetation. Not a species has been found in this habitat that is common to the other groups. Here the volvate and annulate species of Agaricales flourish, also several large fleshy species with bright colored pilei. In the leaf débris mentioned, several species of *Boletus* are found. These are all, without exception, Spring fungi.

Group IV includes those growing in grassy places, on lawns, etc., where the ground is frequently watered and the turf permanent. The Phallales are prominent members of this group, especially *Phallus rubicundus*, which was found in several widely separated localities, each time in lawns, open and unshaded. One yard especially had them in great abundance; at least one hundred specimens were collected in various stages of development, from the hyphae just forming a weft, to the mature and deliquescing plant. The parties living at this place said the fungus had appeared in their yard every year during the last ten years. All the specimens were found during April and May; none appeared from May to September, probably because exceedingly hot dry weather has prevailed since then. Two specimens of *Simblum rubescens* were found close together, on a partially shaded lawn; this is much rarer here than *P. rubicundus*, as the two specimens were all that have been found after careful and continued search during the entire spring, which has been exceedingly rainy and wet, and therefore unusually favorable to fungal growths of every description; many fungi have undoubtedly been collected during this season that will probably not be seen again in years.

Group V contains the epixylous species, the wood being in

a more or less rotten condition; these are further limited by the fact that most of the wood here, such as mesquite (*Prosopis*), cedar (*Sabina*) and mountain oak (*Quercus*) do not readily decay; the fungi are thus confined mainly to elm (*Ulmus crassifolia*), cottonwood (*Populus monilifera*), hackberry (*Celtis Mississippiensis*), etc., which do not form a very prominent part of the timber in this vicinity. Polyporaceae are especially common in this group, over twenty species having been found, *Clavaria*, *Coprinus* and *Xerotus* are also represented by several species, one very large club-shaped *Clavaria* being quite conspicuous on old elm stumps. The beautiful geaster-like *Urnula* belongs in this group; it is strictly a Winter species.

Group VI contains those growing in the open rocky or gravelly soils, consisting of few species, usually of Lycoperdales and their allies. These are all strongly xerophytic, mainly terrestrial, the early stages of their existence being passed beneath the soil thus securing better protection. They seem to have adapted themselves better than any of the other fungi to their environments.

Their spores show a special adaptation to xerophytic conditions, being more or less oily, often hyaline and capable of resisting great heat. Being disseminated by the wind they ought to be widely distributed. These characters have been selected by the necessity of existing in this hot dry climate.

The most abundant and widely distributed of this group is a species of *Polysaccum*, which is found in open rocky, gravelly soil or in the mesquite flats. Two rare and unique species closely related to *Gyrophragmium* come in this group; the larger is an annulate species 10–14 cm. tall, with short thick stipe, an agaric-like pileus and lamellae, spores slate-black, ovate-spheroid and wind-disseminated; the other species is much smaller, being only 4–7 cm. tall, with pileus 3 cm. broad, lamellae naked, attached at one end to a central disc and forming a plant somewhat like *Montagnites*, only the lamellae are persistent and dry and the spores wind-disseminated. Both species are evidently connecting links between the Agaricales and Lycoperdales, *Mycenastrum* has two species here, one * with a leathery peridium,

* Found also under elm tree in leaf débris; young stages of the species were found in August at same place.

short thick spiny capillitium and dark brown spherical spores; the other is two inches in diameter with a thick corky peridium and yellow spore mass, the capillitium is longer and more branched.

These species mentioned above indicate a relationship to our Western fungi.

Characteristic representatives of the various groups of fungi as indicated above are as follows:

PARASITIC FUNGI

Gymnosporangium macropus on *Juniperus Virginiana*. March.

Gymnosporangium sp. on *Sabina sabinoides*. March.

Balansia sp. on *Stipa leucotrica*. May.

Puccinia xanthi on *Xanthium strumarium*, III. July–Sept.

Puccinia sp. on *Verbena encelioides*, II. and III. Nov.

Puccinia tanaceti on *Helianthus annuus*, II and III. July.

Puccinia gonolobi on *Gonolobus laevis*, III. July.

Puccinia asparagi on *Asparagus*, III. July.

Puccinia pruni-spinosa, on *Prunus Americana*, II. and III. July.

Puccinia pruni-spinosa on *Prunus Persica*, II. Sept.–Oct.

Puccinia sp. on *Ruellia tuberosa*, II. July–Aug. II. and III. Sept.–Oct.

Puccinia vexans on *Bouteloua racemosa*, II. and III. Sept.–Oct.

Puccinia sp. on *Vernonia altissima* and *V. angustifolia*, II. and III. August.

Puccinia smilacis on *Smilax tamnoides*, II. April–Sept.

Puccinia graminis on wheat and oats, II. and III. June.

Puccinia sp. on *Gaura*, I. and II. March.

Puccinia sp. on *Berberis trifoliata*, I., II., III. March–April.

Puccinia sp. on *Anemone Virginiana*, I., II., III. and *spermagonia*. March–April.

Uromyces trifolii on *Trifolium Carolinianum*, I., II., III. March–May.

Uromyces sp. on *Prosopis juliflora*, II. May–June. II. and III. July–August.

Uromyces euphorbiae on various species of *Euphorbia*, II. and III. July–October.

Uromyces sp. on *Asclepiodora decumbens*, II., III. July.

Uromyces appendiculatus on *Indigofera leptosepala*, II., III July.

a more or less rotten condition; these are further limited by the fact that most of the wood here, such as mesquite (*Prosopis*), cedar (*Sabina*) and mountain oak (*Quercus*) do not readily decay; the fungi are thus confined mainly to elm (*Ulmus crassifolia*), cottonwood (*Populus monilifera*), hackberry (*Celtis Mississippiensis*), etc., which do not form a very prominent part of the timber in this vicinity. Polyporaceae are especially common in this group, over twenty species having been found, *Clavaria*, *Coprinus* and *Xerotus* are also represented by several species, one very large club-shaped *Clavaria* being quite conspicuous on old elm stumps. The beautiful geaster-like *Urnula* belongs in this group; it is strictly a Winter species.

Group VI contains those growing in the open rocky or gravelly soils, consisting of few species, usually of Lycoperdales and their allies. These are all strongly xerophytic, mainly terrestrial, the early stages of their existence being passed beneath the soil thus securing better protection. They seem to have adapted themselves better than any of the other fungi to their environments.

Their spores show a special adaptation to xerophytic conditions, being more or less oily, often hyaline and capable of resisting great heat. Being disseminated by the wind they ought to be widely distributed. These characters have been selected by the necessity of existing in this hot dry climate.

The most abundant and widely distributed of this group is a species of *Polysaccum*, which is found in open rocky, gravelly soil or in the mesquite flats. Two rare and unique species closely related to *Gyrophragmium* come in this group; the larger is an annulate species 10–14 cm. tall, with short thick stipe, an agaric-like pileus and lamellae, spores slate-black, ovate-spheroid and wind-disseminated; the other species is much smaller, being only 4–7 cm. tall, with pileus 3 cm. broad, lamellae naked, attached at one end to a central disc and forming a plant somewhat like *Montagnites*, only the lamellae are persistent and dry and the spores wind-disseminated. Both species are evidently connecting links between the Agaricales and Lycoperdales, *Mycenastrum* has two species here, one * with a leathery peridium,

* Found also under elm tree in leaf débris; young stages of the species were found in August at same place.

short thick spiny capillitium and dark brown spherical spores; the other is two inches in diameter with a thick corky peridium and yellow spore mass, the capillitium is longer and more branched.

These species mentioned above indicate a relationship to our Western fungi.

Characteristic representatives of the various groups of fungi as indicated above are as follows:

PARASITIC FUNGI

Gymnosporangium macropus on *Juniperus Virginiana*. March.

Gymnosporangium sp. on *Sabina sabinoides*. March.

Balansia sp. on *Stipa leucotrica*. May.

Puccinia xanthi on *Xanthium strumarium*, III. July–Sept.

Puccinia sp. on *Verbena encelioides*, II. and III. Nov.

Puccinia tanaceti on *Helianthus annuus*, II and III. July.

Puccinia gonolobi on *Gonolobus laevis*, III. July.

Puccinia asparagi on *Asparagus*, III. July.

Puccinia pruni-spinosa, on *Prunus Americana*, II. and III. July.

Puccinia pruni-spinosa on *Prunus Persica*, II. Sept.–Oct.

Puccinia sp. on *Ruellia tuberosa*, II. July–Aug. II. and III. Sept.–Oct.

Puccinia vexans on *Bouteloua racemosa*, II. and III. Sept.–Oct.

Puccinia sp. on *Vernonia altissima* and *V. angustifolia*, II. and III. August.

Puccinia smilacis on *Smilax tamnoides*, II. April–Sept.

Puccinia graminis on wheat and oats, II. and III. June.

Puccinia sp. on *Gaura*, I. and II. March.

Puccinia sp. on *Berberis trifoliata*, I., II., III. March–April.

Puccinia sp. on *Anemone Virginiana*, I., II., III. and *spermagonia*. March–April.

Uromyces trifolii on *Trifolium Carolinianum*, I., II., III. March–May.

Uromyces sp. on *Prosopis juliflora*, II. May–June. II. and III. July–August.

Uromyces euphorbiae on various species of *Euphorbia*, II. and III. July–October.

Uromyces sp. on *Asclepiodora decumbens*, II., III. July.

Uromyces appendiculatus on *Indigofera leptosepala*, II., III July.

Uromyces sp. on an unknown legume, II., III. July.

Uromyces terebrinthi, on *Rhus toxicodendron*, II. July–Aug.

Uromyces spermacoces, on *Diodia teres*, II. and III. Aug.

Accidium xanthoxyli, on *Xanthoxylum clavis-Hercules* var. *fruticosum*.

Accidium euphorbiae on various species of *Euphorbia*. Aug.–Oct.

Accidium dracontium on *Arisaema dracontium*.

Ustilago segetum, on oats and barley. May.

Ustilago utriculosa, on *Polygonum* sp. Oct.

Ustilago sp. on sheaths and leaves of *Boutelona racemosa*. Sept.–Oct.

Ustilago maydis on *Zea Mays*. Sept.

Ustilago sorghi on *Sorghum vulgare*. July.

Ustilago sp. on *Cenchrus tribuloides*. Aug.–Sept.

Tilletia sp. on *Hordeum nodosum*. June.

Uredo fici on *Ficus carica*. Sept.–Oct.

Uredo sp. on *Commelina Virginica*. Oct.

Coleosporium vernoniae on *Vernonia angustifolia*. Aug.

Coleosporium sp. on *Salix nigra*. July.

Coleosporium ipomoeae, on *Ipomoea bona-nox* and *I. purpurea*. Oct.

Albugo amaranthi on *Amaranthus* sp. June–Sept.

Albugo portulacae on *Portulaca oleracea*. Aug.

Albugo ipomoea-pandurata, on various species of *Ipomoea*. July.

Albugo Platensis on *Boerhavia decumbens*. July.

Albugo candida on *Lepidium Virginicum*. Spring.

Peronospora geranii, on *Geranium Carolinianum*. April.

Periconia pycnospora, on *Ligustrum Californicum*. Sept.–Oct.

SAPROPHYTIC FUNGI

Group I. Dung-inhabiting Species

Coprinus, 3 sp.
Lasiobolus, 2 sp.
Humaria, 1 sp.
Peziza (*Tazetta*), 1 sp.
Pilobolus, 1 sp.
Poronia oedipus.
Lachnea, 1 sp.
Cyathus striatus.
Sphaerobolus, 1 sp.
Sordaria, 1 sp.
Mucor, several sp.
Panaeolus, 1 sp.
Psilocybe, 1 sp.
Stropharia, 1 sp.

also two species of Myxomycetes.

Group II. Cedar Brake Fungi

Astraeus, 1 sp.
Tylostoma, 1 sp.
Lycoperdon, 1 sp.
Cantharellus, 2 sp.
Protodermium, 1 sp.
Geaster, 1 sp.
Sarcosphaera, 1 sp.
Morchella, 1 sp.
Helvella, 1 sp.
Lepiota, 3 sp.
Tricholoma, 1 sp.
and many undetermined species of Agaricales.

Group III. Post Oak Land Species

Amanita, 3 sp.
Amanitopsis, 7 sp.
Agaricus, 1 sp.
Lepiota, 3 sp.
Inocybe, 2 sp.
Lactarius, 2 sp.
Russula, several sp.
Hebeloma, several sp.
Boletus, several sp.
Clitocybe.

A large number of species of this group yet await identification.

Group III. Species of grassy Places and Lawns.

Phallus rubicundus.
Phallus impudicus.*
Simblum rubescens.
Clitopilus, 1 sp.
Lepiota, 2 sp.
Polyporus, 1 sp.
and several small species of Agaricales.

Group V. Epixylous Species

Polyporus, 20 sp.
Clavaria, 3 sp.
Coprinus, 3 sp.
Bolbitius, 1 sp.
Schizophyllum, 1 sp.
Lepiota, 1 sp.
Urnula Geaster.
Ascophanus, 1 sp.
Hydnum, 1 sp.
Hebeloma, 1 sp.
Dacryomyces, 1 sp.
Guepinia, 1 sp.
Ulocolla, 2 sp.
Lentinus, 2 sp.
Xerotus, 2 sp.
Lachnea, 1 sp.
Panus, 2 sp.
Sphaerobolus, 1 sp.
Cyathus, 1 sp.
Stemonitis, 2 sp.
Arcyria, 1 sp.

* Local habitat not known definitely.

Group VI. Species of open rocky Soil.

Lycoperdon, several sp.	*Calvatia*, 2 sp.
Bovistella, 1 sp.	*Polysaccum*, 1 sp.
Gyrophragmium (?) 2 sp.	*Mycenastrum*, 2 sp.
Scleroderma, 1 sp.	*Coprinus*, 1 sp.

A complete list and descriptions will be prepared for publication as early as possible. From present indications this new and unworked field will prove exceedingly fruitful in new species and of much interest to mycologists.

UNIVERSITY OF TEXAS, SCHOOL OF BOTANY.

Heteromorphism in Helianthemum

By John Hendley Barnhart

It is no new discovery that in some of our common North American species of *Helianthemum* the flowers are of different forms on the same plant. In 1824, Dunal, in the first volume of DeCandolle's Prodromus, described 112 species of *Helianthemum* known to him; only seven of them were American, and of these he constituted the section *Lechioides*, but no mention is made of the occurrence of heteromorphism. In the same year, however, Elliott (Bot. S. C. & Ga. **2**: 5), at the end of his description of *H. corymbosum*, remarks: "Frequently in a corymb, one or two flowers rise conspicuously above the rest, and the capsules then become much larger."

Sweet's great illustrated work on the Cistineae was published in parts from 1825 to 1830, and it is easy to trace through its pages the development of the author's ideas about heteromorphism in the American species of *Helianthemum*. Under No. 11, *H. polygalaefolium*, published in November, 1825, he says: "we have not seen any perfect flowers of *H. Brasiliense*, as it did not bloom till autumn, and the flowers were all apetalous, which was also the case with the autumn flowers of the present species, and all the other species of this section that we have had an opportunity of examining this season; the apetalous flowers all produce perfect seeds, but we cannot understand the reason of their producing perfect flowers only in summer."

Under No. 21, *H. Canadense* (May, 1826): "Its handsome flowers are produced in abundance in July and August; after that time it continues to bloom and ripen seeds plentifully until October; but the flowers after August are all without petals, the calyx and capsules are also smaller and of a different form from those produced by the flowers with petals; this is also the case with *H. polygalaefolium* and *Brasiliense*, and we expect with the whole of this section." Under No. 43, *H. Brasiliense* (March, 1827): "the present drawing was taken last May, the first time that it produced perfect flowers; those that were produced the preceding autumn

being all apetalous, as are the autumn flowers of all the species of this section that we have had an opportunity of seeing; but those apetalous flowers produce as perfect seeds as the complete flowers."

Under No. 99, *H. Carolinianum* (July, 1829), no mention of heteromorphism is made, although it is placed in the section *Lechioides;* yet under No. 110, *H. glomeratum* (January, 1830), is given the following broad generalization: "Like all the other American species that we have yet seen or heard of, it belongs to the section *Lechioides* of DeCandolle; all the species of which produce flowers with petals, in the spring and early in summer, whereas all those that are produced in autumn, which are much more numerous, are all apetalous."

Spach (Ann. Sci. Nat. II. **6**: 370. D. 1836) segregates all the American species formerly referred to *Helianthemum*, except *H. Carolinianum*, in a new genus *Heteromeris*, characterized by the two kinds of flowers on each plant; Torrey and Gray (Fl. N. Am. **1**: 151. 1838) correctly attribute heteromorphous flowers to all their North American species except *H. scoparium* and *H. Carolinianum*; and the investigation here reported shows that of all the species since described from the same territory (California excepted) none is truly homomorphous.

My attention was first called to this subject by finding an apparently undescribed species of *Helianthemum* in Florida, which upon examination proved referable to the heteromorphic group. Yet its affinity was evidently with *H. Nashii*, which was originally described as having the flowers all alike, and this led to a careful reëxamination, first of the available material of *H. Nashii*, and then of the other North American species.

The most recent review of our species is to be found in Gray's Synoptical Flora (**1**[1]: 189–191. 1895) where four species, *H. Canadense*, *H. majus*, *H. capitatum* and *H. corymbosum*, are said to have heteromorphous flowers, while five, *H. arenicola*, *H. Nashii*, *H. Carolinianum*, *H. scoparium* and *H. Greenei*, are described with the flowers homomorphous. *H. arenicola* and *H. Nashii* must have been placed among the homomorphous species merely because of their original descriptions. Since the appearance of the portion of the Synoptical Flora here referred to, an excellent new species (*H. Georgianum*) has been added (Chapman, Fl. So. U. S.

Ed. 3, 36. 1897); and this, too, contrary to its original description, proves upon careful examination of authentic material to have heteromorphous flowers.

In certain respects the heteromorphism varies in different species. In *H. Canadense* and *H. majus* the petaliferous flowers appear in spring, and are solitary, while the apetalous flowers are autumnal and in clusters; in the remaining species, however, the petaliferous and apetalous flowers appear together, in the same clusters and at about the same time. In *H. Canadense*, *H. majus* and *H. capitatum*, the calyx of the complete flower is much larger than that of the incomplete one; in *H. corymbosum* the contrast is much less striking; while in *H. Georgianum*, *H. arenicola* and *H. Nashii* there is practically no difference in the size of the calyx in the two kinds of flowers. This probably accounts, at least in part, for the fact that heteromorphism has never been suspected in the last three species. The complete flowers are always on longer pedicels than the incomplete ones, in some species many times longer. Flowers intermediate in various degrees between those with perfect expanding petals, and those with no petals whatever, are occasionally present in some (perhaps all) of the species.

Besides the features already noted, which may be seen at a glance—the presence or absence of petals, the size of the calyx, and the length of the pedicels—there are certain less conspicuous but more important differences. In the complete flowers the stamens are from 12 to 30 in number, and the filaments far exceed in length the ovary and even the calyx; the style is very short but distinct, and the ovules are usually numerous (20–60, only 8–10 in *H. capitatum* and *H. Nashii*). The incomplete flowers are cleistogamous, and fertilized very early in the bud; in them the stamens are always less numerous than in the complete ones (only 3–8), the filaments just enough shorter than the ovary, so that the anthers are in contact with the stigma; this rests upon the summit of the ovary, but as it is large, and is contracted to a small point of union with the ovary, it is more exact to say "style obsolete" than "stigma sessile"; and the ovules are always fewer than in the complete flowers of the same species, as a rule less than half the number (6–20, only 3–6 in *H. capitatum* and *H. Nashii*). Of course, the seeds are more numerous in the

individual capsules from the petaliferous flower than in those from the apetalous flowers, but it is unusual for all the ovules to mature in either case.

Following is a table showing the number of stamens and ovules in each kind of flower in each of the species under discussion. The material studied, in addition to my own herbarium, is in the herbaria of the New York Botanical Garden and Columbia University. The table is the result of numerous careful dissections, but all the species are not equally well represented, so that in some instances these figures might be slightly altered by a further study of better material.

	Petaliferous Flowers.		Apetalous Flowers.	
	Stamens.	Ovules.	Stamens.	Ovules.
H. Canadense.	30	30–60	4	6–20
H. majus.	30	30–60	4	6–20
H. capitatum.	12–20	8	3	3
H. Nashii.	15	8–10	5	3–6
H. arenicola.	25	20	5	10
H. corymbosum.	25–30	20	3–6	9
H. Georgianum.	12–16	35	8	17

An examination of the available material of the remaining North American species (including the Mexican ones) shows that *H. glomeratum*, *H. argenteum* and *H. Chihuahuense* are heteromorphous, while *H. scoparium*, *H. Greenei*, *H. Mendocinense*, *H. nutans*, *H. patens*, and *H. Pringlei* seem to form quite a natural group, with homomorphous flowers. *H. Carolinianum* is also homomorphous, but otherwise shows a much closer relationship with the heteromorphous species than with the group just referred to. In fact, it seems to me like a heteromorphous species which has lost its apetalous form of flowers; and it would not surprise me, if its origin could be traced, to find that it had heteromorphous ancestors.

TARRYTOWN, N. Y., October, 1900.

A Criticism on certain new Species of Panicum

By Elmer D. Merrill

In 1898 there was published in the Journal of the Elisha Mitchell Scientific Society,* a paper on the dichotomous group of *Panicum* in the Eastern United States which was evidently intended to be a monograph of this group, covering the territory from Maine to Minnesota, south to Florida and Indian Territory.

Whatever the author's intentions may have been in publishing this paper, it is evident from a cursory examination of his work that he had neither the collections nor the literature necessary to a thorough investigation of this very difficult group, and has succeeded in doing for science vastly more harm than good by expounding these species in such an unsatisfactory manner. An examination of this work is convincing only of the fact that the author is imbued solely with the idea of species-making for the satisfaction of seeing his own name after certain combinations rather than with any idea of the advancement of science.

The whole paper shows a carelessness in preparation of the descriptions of species, synonymy, and citation of specimens which could have been easily avoided with little care and trouble. Gross ignorance or neglect is at once shown by the fact that of the twenty-one species described as new, five of them bore names which were homonyms, or at least so considered by the author later, synonymy thus being burdened with so many useless names. One would think that the author did not even know of the existence of the Index Kewensis as the names in question are listed in that work, or granting that he did know of this work, he did not take the trouble to consult it.

It seems advisable to make some comment on certain species mentioned below, in order that those unfamiliar with the species of this group may not be deceived. Our knowledge of these "new species" is based almost entirely on material sent by the author as typical, but we are unable to discuss many of these forms intelligently at present, simply because in many cases this typical

* 15 : 22–62. 1898.

material was totally different from the published descriptions of the species to which they were referred. In most cases absolutely nothing can be determined from his descriptions which are mostly short and incomplete, especially those of his first paper.

Panicum commelinaefolium Ashe, 1898, not Kunth, 1833, or Rudge, 1805, = *Panicum Currani* Ashe, 1899.

Panicum maculatum Ashe, 1898, not Aubl., 1775, or Reichb., 1831, = *Panicum Yadkinense* Ashe, 1900.

Panicum Georgianium Ashe, 1898 (*Panicum Cahoonianum* Ashe, 1899). *Panicum Georgianum* is not invalidated by *P. Georgicum* Spreng., 1825.

Panicum annulum Ashe, 1898 (*Panicum Bogueanum* Ashe, 1900). *Panicum annulum* Ashe, is not invalidated by *P. annulatum* A. Rich., 1847.

Panicum glabrissimum Ashe, 1898 (*Panicum Shalotte* Ashe, 1900). *Panicum glabrissimum* Ashe is not invalidated by *P. glaberrimum* Steud., 1855.

While it is unfortunate that the author should apply names in the case of the last three species, so similar to older published ones, we cannot understand on what authority the author proposes new names for the species in question, as there is no reason why the first names should not be retained. *Panicum annulum* Ashe, and *Panicum glabrissimum* Ashe, must stand as a monument to their author's carelessness, while his new names for these two species must be considered only as synonyms. It is very evident that there is little danger of these new names and some others in this paper like *Panicum Mattamusketense* and *P. Huachucae* being homonyms. We have been unable to find any authority for the construction of the word *glabrissimum*.

Of these species *Panicum Georgianum* Ashe (*P. Cahoonianum*) is only the branched state of *P. consanguineum* Kunth, and according to Dr. Small's material in the Herbarium of Columbia University the author is in error in stating that it is a low growing grass as in the type collection the old culms are still attached and match *P. consanguineum* exactly. *Panicum Yadkinense* Ashe was described as a new species under the name of *P. maculatum* Ashe, and is identical with *Panicum dichotomum elatum* Vasey, which is treated in the same paper as a distinct form, the author not recog-

nizing that they were the same. Among other species described in this paper *Panicum calliphyllum* Ashe, we cannot consider to be distinct from *P. xanthophysum* A. Gray. *Panicum Ashei* Pearson, evidently named to gratify the author's desire for fame, as this authority is unknown to systematic botanists, is a small form of *Panicum commutatum* Schultes, but may be worthy of specific rank. In his conception of *Panicum nitidum* Lam., the author is evidently very much at sea as he refers a western form to that species with this remark: "In the extreme west *Panicum nitidum* is represented by *P. thermile* Boland., a rather low, nearly glabrous species." He evidently means *Panicum thermale* Boland., but any one who has seen *Panicum thermale* or even the original description, would certainly not consider it glabrous. *Panicum Mattamusketense* Ashe, 1900, is exactly identical with the type of *Panicum discolor*, co-species *vel. varietas major* Muhl., Desc. 115, 1817, in the Herbarium of the Philadelphia Academy of Sciences. This name, however, will have to be retained as Muhlenberg's var. *major* is antedated by *Panicum nitidum* var. *majus* Pursh, 1814. *Panicum Orangense* Ashe, is exactly *Panicum lanuginosum* Ell., according to a specimen so named by Elliot, in the Herbarium of Columbia University. The first specimen cited under *Panicum haemacarpon* Ashe, is exactly *Panicum Atlanticum* Nash, while other material distributed by the author under this name is *Panicum commonsianum* Ashe. Under *Panicum Huachucae* the mistake is made of applying a local name to a species which, according to the author's statement, extends from Arizona to Iowa and North Carolina, and according to specimens distributed, to New York. We have as yet been unable to separate *Panicum meridionale* and *P. filiculme*, in a satisfactory manner, either by the original descriptions or by comparison of typical material. *Panicum meridionale* may even prove to be unworthy of specific rank. *Panicum microphyllum* Ashe is a doubtful species and the name is invalidated by that of *Panicum zizanioides*, var. *microphyllum* Doell.; Mart. Fl. Bras. 2^2: 229. 1877.

In the same publication * this author publishes another article in which one new species of *Panicum*, and one species and variety of *Andropogon* are described, and two new names proposed for

* Journ. Elisha Mitchell Sci. Soc. 15: 112–114. 1899.

species previously published by him. Still later * another paper was published describing 14 new species of *Panicum* and proposing three new names. One might suppose that the author would have benefited somewhat from his previous publications regarding his conception of species, but this apparently is not the case. We have not had an opportunity to study all these proposed species, but the following notes on this last paper may indicate its value to science.

Panicum austro-montanum Ashe, 1900, is exactly *P. Earlei* Nash, 1899. *Panicum paucicilatum* Ashe we cannot consider distinct from *Panicum Nashianum* Scribn., although the spikelets of the former are somewhat smaller than those of typical *P. Nashianum.* In regard to the latter species, in the first-mentioned paper it was referred to the very distinct *Panicum demissum* Trin., a South American species, while in the present paper both *Panicum demissum* and *P. Nashianum* are mentioned, while what is clearly only a form of the latter is described as a new species. *Panicum Onslowense* Ashe, 1900, cannot be distinguished from *Panicum Webberianum* Nash, 1896, a species that was recognized in the first paper mentioned, but unrecognized and published as a new species in the paper under discussion. *Panicum arenicoloides* Ashe, and *Panicum orthophyllum* Ashe, should both be referred to *Panicum angustifolium* Ell., differing only in being slightly more pubescent and with somewhat smaller spikelets than typical *P. angustifolium. Panicum subvillosum* Ashe, 1900, is identical with the form previously described by the same author as *Panicum filiculme. Panicum filirameum* Ashe, 1900, is exactly *Panicum arenicolum* Ashe, 1898. *Panicum Mississippiense* Ashe, 1900, not *P. glabrum Mississippiensis* Gattinger, 1887, is practically identical with *Panicum inflatum* Scribn. & Smith, differing from the type of the latter only in its greater height, scarcely inflated sheaths, and pale, not purplish color, characters due entirely to habitat. In this last paper it seems evident that the author is the only botanist in this country so fortunate as to know exactly what *Panicum dichotomum* Linn. is, as he speaks of certain forms as being related to that species.

On further study many more of these proposed "new species" will doubtless be found to be simply forms of previously described

* *Ibid.*, 16: 84–91. 1900.

species and unworthy of specific rank, while some of them will be found to have absolutely no distinctive characters, as illustrated by the "new species" mentioned above.

It is evident from certain collections that we have examined recently that this author purposes to publish more "new species" in this group, as in one small collection in question which had previously been submitted to him, was found three proposed "new species," not one of which is worthy of even varietal rank. In accepting such articles for publication as the ones above discussed, the editor of the Journal of the Elisha Mitchell Scientific Society is open to criticism, as such publications do vastly more harm to science than good.

Proceedings of the Club

TUESDAY EVENING, OCTOBER 9, 1900

Professor Underwood presided, in absence of other officers; ten persons present.

The following resignations were accepted: Mrs. E. K. Dunham, Miss Bernice Mayers, Mr. Gustaf F. Heinen.

Professor MacDougal reported a recommendation from the Editorial Board that beginning January 1, 1901, the price of the BULLETIN of the Club be fixed at $3.00 a year to non-members.

Professor MacDougal moved that consideration of the membership fee and of the price of Memoirs or other matter to others than members be committed to a committee of five, of which the President and Editor be members, to report before January, 1901. The three other members of that Committee, were Dr. MacDougal, the Secretary, and Professor Lyon.

The scientific program followed and consisted of reports of summer work.

Mr. Harper reported collections in Georgia during three and a-half months, traversing all the geological formations from the mountains to the sea, and collecting 754 numbers.

Dr. Rydberg reported two months spent in southern Colorado, with several new species; among them an interesting cactus from elevation of 8,000 feet in the Bitter Root Mountains, now growing at the Botanical Garden.

Dr. Howe reported nine weeks spent in collecting marine algae at three very different stations, Bermuda, Martha's Vineyard (at Edgartown) and at Seguin Island, near the mouth of the Kennebec. Dr. Howe discussed the Bermuda flora in the light of the Challenger report, which recognizes 326 species, of which 144 are indigenous (in 109 genera and 50 families); out of the 144, 109 occur in the southeastern United States and 108 in the West Indies. The Bermuda vegetation is essentially West Indian in character, and includes only 8 endemic species. Among the very few found also here are *Osmunda regalis* and *O. cinnomomea*, *Wood-*

wardia Virginica, *Solidago sempervirens*, and *Typha angustifolia*. Practically the only trees are the Palmetto and the Bermudian cedar, the latter 20 to 50 feet high, and often 1 or 2 feet thick, though some old shells are 5 feet. The oleander is naturalized and in some quarters covered the whole landscape with bloom. Because of the practical absence of frost, tropical trees are acclimated with surprising success. The coffee tree has run wild in the sinkholes. About twenty-five ferns were known, and eight Musci and six Hepaticae had been already observed. There is nowhere any brook and only one moss and one hepatic are common; the others are in the Devonshire marsh and the sinkholes of the Walsingham region. These are open caves 30 or 40 feet deep, with more moisture and shade and less wind, and therefore showing quite a different flora. There Dr. Howe discovered as many as fifteen Hepaticae. He also greatly increased the number of the marine algae beyond the 132 of the Challenger report. The marine flora seems at first scanty on account of the absence of *Fucus* and *Ascophyllum*, but proves to be varied and interesting. It is practically that of southern Florida and the West Indies.

Dr. MacDougal reported work in northern Idaho in the Priest River basin which had perhaps never been visited by a botanist before. There was frost nearly every night. The tangled wild wood could not be penetrated more than four miles a day, except as it is entered by meadows stretching back from the lake. Beaver dams a quarter mile long cross these meadows and convert the upper portions into sedgy marshes. A colony of beavers was active with 400 yards of his camp. Great stretches of *Drosera* carpet the marshes. Interesting plants were collected to 325 numbers.

Professor Lloyd reported upon work on the Gulf coast begun after the close of his classes at the Columbia University summer school. Professor Lloyd and Professor Tracy procured a barge at Biloxi, Miss., by which they explored the flora of the islands of the Mississippi Sound, and of the delta proper. It was necessary to sail for miles in two feet of water, and occasionally to jump out and push. Always a furrow of mud followed in their wake. The islands bear a pine-barren and a sand-dune flora, with masses of *Pinguicula* and *Drosera*. The island surfaces are flat and form

remnants of the tertiary Mississippi delta; they average only two feet above water, with a ridge a foot higher on the seaward side, composed of shell-fragments and continually shifted inward by the wind, the waves meanwhile gnawing off the seaward edge at the same rate.

Professor Burgess reported his continued observations on certain asters at stations near Lake Erie, Boston, the White Mountains, New York City, etc., at each of which he has kept certain varying species under scrutiny for some years to determine their range of variation under unchanged environment.

Professor Underwood reported herbarium work at Kew, the British Museum, and Paris, with particular reference to the Cosson herbarium which contains Fée's types and is very rich in ferns especially of South America and the West Indies. A week was given to a trip to Biarritz, France, and San Sebastián, Spain, and an account was given of the turpentine industry now flourishing among the pine forests of the Landes originally planted as a protection from the shifting sands. These pines average about ten inches in diameter. Maize was commonly cultivated in the Basque provinces, the tops being cut off to favor the ripening of the ears, as in our South.

Adjournment followed.

E. S. BURGESS,
Secretary.

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